


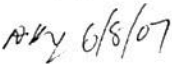
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
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May 31, 2007

MEMORANDUM

SUBJECT: Naval Station Pensacola Turning Basin MPRSA 103 Evaluation Decision Memo

FROM: Gary W. Collins 

THRU: Douglas K. Johnson  6/8/07

TO: File

This memorandum serves to document EPA Region 4's independent determination of compliance of maintenance dredged material from the Naval Station Pensacola (NASP) Turning Basin (TB) with the Ocean Dumping Criteria (ODC). The TB at NASP was sampled for testing in March 2002 and the Pensacola offshore Ocean Dredged Material Disposal Site (ODMDS) is the proposed disposal location.

In a May 2007 MPRSA Section 103 Evaluation, the Corps of Engineers has determined that material from shoals along the northern edge of the TB at NASP is suitable for ocean disposal. Data from the following documents were used for this evaluation:

- I. *Evaluation of Dredged Material from the Naval Station Pensacola Turning Basin, Escambia County, Florida.* Final Report to US Army Corps of Engineers, Mobile District by EA Engineering, Science, and Technology, Inc. Mobile, AL. December 2005.
- II. *Final Environmental Impact Statement for Designation of a New Ocean Dredged Material Disposal Site, Pensacola, Florida.* US Environmental Protection Agency. September, 1988.

**Background**

In order to maintain the authorized project depths of - 42 feet (MLLW), plus a requested 2 feet of advance maintenance and an additional 2 feet of allowable dredge, it is estimated that approximately 190,000 cubic yards of material will need to be removed by either mechanical means or hopper dredge during a 2-3 month period within FY08. The last time this area was dredged was in 1990. During the 2002 sampling of the TB, originally 5 separate locations were cored down to - 46 feet. Because maintenance dredging of shoals is only needed along the northern limits of the TB, the evaluation of project material with the Ocean Dumping Criteria

(ODC) has been restricted to the two sample locations (PNS02-02 and PNS02-05) deemed most likely to represent material dumped in the ODMDS.

The grain size of the project material varies from one station to the other (PNS02-02 = 47.4 % fines and PNS02-05 = 11.9 % fines). In addition, the fine-grained fraction of the selected reference station (PNS02-REF = 64.1 %) is also different from that of the other two test stations. Sample station locations and the areas defining the proposed limits of dredging are shown on figures provided as part of the 103 Evaluation. Below is EPA Region 4's independent evaluation of the criteria utilizing data from the previously mentioned reports.

### **Exclusionary Criteria**

The exclusionary criteria apply to materials which meet any of the following three criteria (Part 227.13b), and may be considered environmentally acceptable for ocean dumping without further testing:

- 1) The dredged material is comprised predominantly of sand, gravel, rock, or any other naturally occurring bottom material with grain sizes larger than silt, and the material is found in areas of high current or wave energy.
- 2) Dredged material is for beach nourishment or restoration and is comprised predominantly of sand, gravel, or shell with particle sizes comparable with material on the receiving beaches.
- 3) The material proposed for placement is substantially the same as the substrate at the proposed disposal site and the site from which the material proposed for disposal is far removed from known existing and historical sources of pollution as to provide reasonable assurance that such material has not been contaminated by such pollution.

The material proposed for ocean dumping from the NASP TB does not meet any of the three criteria and therefore does not meet the exclusionary criteria.

Previous testing performed in this location was completed prior to 1988, when approximately 3.8 million cubic yards were dredged and dumped into the ODMDS. Because maintenance dredging has not been needed since that project, this is the first opportunity to evaluate the material under the testing protocols established under the 1991 Green Book.

The results of bulk sediment chemistry testing for these project sediments are summarized in both the Final Testing Report and the Section 103 Evaluation provided by the District. These results were used primarily to select target analytes for use in the Bioaccumulation testing discussed later.



## **Water Column Determinations - 40 CFR § 227.6(c)(1) and 227.27(a)**

### Evaluation of the liquid phase - Water Quality Criteria

Applicable marine water quality criteria must not be exceeded after initial mixing. There are applicable marine water quality criteria for constituents in the material, including listed constituents.

Comparisons to the saltwater quality criteria indicated that  $\text{NH}_3\text{-N}$  exceeded the chronic criterion (1.4 mg/L) for station PNS02-02. A maximum 2-fold dilution would be required to comply. None of the detected chemical constituents from the elutriate of PNS02-05 exceeded either acute or chronic saltwater quality criterion. STFATE dilution modeling results indicate the applicable marine water quality criteria were not exceeded. A dilution of 203 to 1 was achieved within 1 hour following disposal. Even though none of the constituents detected from the elutriate of PNS02-05 exceeded either acute or chronic criterion, results of the model indicated that a 323-fold dilution occurs within the first hour. For a typical disposal volume of 2,000 cubic yards, the model indicated that after 4 hours following disposal, a 1511-fold and a 2494-fold dilution would occur for PNS02-02 and PNS02-05, respectively.

### Evaluation of the liquid phase - Liquid Phase Bioassay

Liquid phase bioassays run as part of the suspended particulate phase on three appropriate sensitive marine organisms must show that after initial mixing (as determined under 40 CFR 227.29(a)(2)), the liquid phase of the material will not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms. Bioassays utilizing three species (*Mysidopsis bahia*, *Cyprinodon variegatus* and *Arbacia punctulata*) were conducted. Greater than 50% survivorship/fertilization occurred in all elutriate treatments and therefore it is not possible to calculate an  $\text{LC}_{50}/\text{EC}_{50}$ . In such cases an  $\text{LC}_{50}$  of 100% is used in the mixing analysis. A dilution of 100 to 1 is needed to meet the toxicity threshold of 0.01 of the  $\text{LC}_{50}$ . As discussed in the previous paragraph dilutions of 203 and 323 were achieved within the first hour, 1511 and 2494 were achieved after 4 hours and at all times outside the disposal site, respectively.

Accordingly, it is concluded that the liquid phase of the material is in compliance with 40 CFR 227.6(c)(1) and 227.27(a).

## **Suspended Particulate Phase Determination - 40 CFR § 227.6(c)(2) and 227.27(b)**

Suspended particulate phase bioassay testing of the material using three appropriate sensitive marine organisms must show that after initial mixing (as determined under 40 CFR 227.29(a)(2)), the suspended particulate phase of this material would not exceed a toxicity threshold of 0.01 of a concentration shown to be acutely toxic in the laboratory bioassays, and thus would not result in significant mortality. The factor of 0.01 is applied to ensure that there will be no significant adverse sublethal effects. Bioassays utilizing three species (*Mysidopsis bahia*, *Cyprinodon variegatus* and *Arbacia punctulata*) were conducted. Greater than 50% survivorship/fertilization occurred in all elutriate treatments and therefore it is not possible to

calculate an  $LC_{50}/EC_{50}$ . In such cases an  $LC_{50}$  of 100% is used in the mixing analysis. A dilution of 100 to 1 is needed to meet the toxicity threshold of 0.01 of the  $LC_{50}$ . As discussed in the previous paragraph dilutions of 203 and 323 were achieved within the first hour, 1511 and 2494 were achieved after 4 hours and at all times outside the disposal site, respectively. Accordingly, it is concluded that the suspended phase of the material complies with 40 CFR 227.6(c)(2) and 227.27(b).

### **Benthic Determinations - 40 CFR § 227.6(c)(3) and 227.27(b)**

The solid phase of the material must be evaluated for compliance with Sections 227.6(c)(3) and 227.27(b) using the results of two specific types of evaluations on the solid phase of the material, one focusing on the acute (10-day) toxicity of the material, and the other focusing on the potential for the material to cause significant adverse effects due to bioaccumulation. Both types of tests use appropriate sensitive benthic marine organisms according to procedures approved by USEPA and the USACE.

#### Solid phase toxicity evaluation

Benthic phase bioassay testing of the material must show that toxicity in the dredged material is not statistically greater than in the reference sediment, or does not exceed mortality in the reference by at least 10% (20% for amphipods). Ten-day toxicity tests were conducted on project materials using polychaetes (*Neanthes arenaceodentata*) and amphipods (*Leptocheirus plumulosus*), which are appropriate sensitive benthic marine organisms. These organisms are good predictors of adverse effects to benthic marine communities.

In the polychaete tests, mortality in the reference was 16 %, followed by 21 % for PNS02-02 and 18 % for PNS02-05, neither being significantly less than the reference. In the amphipod tests, mortality was 4 % in the reference, 12 % for PNS02-02, and 4 % for PNS02-05. Again, neither of the project sediments were significantly less than the reference. These results show that the solid phase of the material does not cause significant mortality and meets the solid phase toxicity criteria of §227.6(c)(3) and 227.27(b).

#### Solid phase bioaccumulation evaluation

The Green Book describes an approved process of evaluating bioaccumulation potential using comparative analysis of project sediment bioaccumulation to FDA Action Limits, reference sediment bioaccumulation, and evaluation of eight additional factors for assessing the significance of bioaccumulation. The project sediment bioaccumulation test results for each compound of concern are sequentially compared to: a) FDA Action Limits; b) reference test; and, c) general risk-based evaluations. If the evaluation shows that the project sediment does not exceed a) the FDA Action Limit or b) the reference test results for a particular compound then this indicates that the disposal of the material would not result in adverse effects due to that chemical, and there is no need to further evaluate that individual chemical in the third step.



Bioaccumulation tests were conducted on the solid phase of the project material for contaminants of concern identified above using two appropriate sensitive benthic marine organisms, *Nereis virens* (polychaete) and *Macoma nasuta* (bivalve). These species are considered to be good representatives of the phylogenetically diverse base of the marine food chain.

The following contaminants of concern were analyzed for this project:

PNSREF02	metals, PAHs, PCB congeners
PNS02-02	metals, PAHs, PCB congeners
PNS02-05	metals

#### *Comparison to FDA Action Limits*

There are FDA Action Limits for several of the contaminants of concern identified above. For the NASP maintenance material being evaluated here, none of the contaminants, for which there are FDA Action Levels, exceed such thresholds in the tissues of organisms exposed to project sediments for 28 days.

#### *Comparison of Bioaccumulation Test Results to Reference Sediment Test Result*

Concentrations of contaminants in tissues of organisms exposed for 28 days to project sediments were compared to concentrations in tissues of organisms exposed for 28 days to reference sediment. In the polychaete test, only arsenic from one station (PNS02-05) statistically exceeded the reference value. In the bivalve test, both fluoranthene and pyrene from PNS02-02 statistically exceeded the reference value.

Analyte  μg/kg (wet wt.)	PNSREF02	PNS02-02	PNS02-05
<i>M.nasuta</i>			
Fluoranthene	3.4	6.48	n/a
Pyrene	3.62	11.1	n/a
<i>N.virens</i>			
Arsenic	2.68	n/a	3.24

#### *General Risk-based Evaluations*

When the bioaccumulation of contaminants in project sediments exceeds that in the reference, general risk-based evaluations must be considered. To comply with 227.13(c)(3), eight factors are used to make this determination.

1. The number of species in which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference material.

There were two species tested in this evaluation, *Nereis virens* (polychaete) and *Macoma nasuta* (bivalve). Even though both species exhibited at least one exceedance, the polychaete had only one while the bivalve had only two cases.

2. The number of contaminants for which bioaccumulation from the dredged material is statistically greater than bioaccumulation from the reference.

Arsenic, fluoranthene, and pyrene were found to have bioaccumulation from the dredged material statistically greater than bioaccumulation from the reference. None of the three contaminants were found to be statistically greater in both species.

3. Magnitude by which the bioaccumulation from the dredged material exceeds bioaccumulation from the reference material.

The table below shows the magnitude (percent increase) by which each station's bioaccumulation exceeded the reference material. Only statistically significant exceedances are presented. Average (over the five replicates) values were used in the comparison.

Analyte  $\mu\text{g/kg}$ (wet wt.)	PNSREF02	PNS02-02  % Increase	PNS02-05  % Increase
<i>M.nasuta</i>			
Fluoranthene	3.4	191	n/a
Pyrene	3.62	307	n/a
<i>N.virens</i>			
Arsenic	2.68	n/a	121

4. Toxicological importance of the contaminants whose bioaccumulation from the dredged material statistically exceeds bioaccumulation from the reference.

The toxicity of arsenic is well known and firmly documented in the literature. Both fluoranthene and pyrene are also documented as being relatively toxic to aquatic organisms.

5. Phylogenetic diversity of the species in which bioaccumulation for the dredged material statistically exceeds bioaccumulation from the reference material.

The species tested were *Macoma nasuta* and *Nereis virens*. These species were recommended in the original 1991 "Evaluation of Dredged Material Proposed for Ocean Disposal" page 12-4, Table 12-1; labeled "Examples of Appropriate Test Species for Determining Potential Bioaccumulation From Whole Sediment Tests". The basic recommendations include requirements that a burrowing polychaete and a deposit feeding bivalve mollusk be tested. The test organisms are important in the region ecologically, represent species that provide adequate biomass for analysis, and are detritus feeders, which ingest sediments.

6. Propensity for the contaminants with statistically significant bioaccumulation to biomagnify within the aquatic food webs.

While arsenic has been documented as having a very high propensity to biomagnify within aquatic food webs, there is no such evidence for either fluoranthene or pyrene (U.S. Army Engineers, Waterways Experiment Station, Environmental Laboratory. Environmental Effects of Dredging Tech Notes. EEDP-01-33 January 1995).

7. Magnitude of toxicity and the number and phylogenetic diversity of species exhibiting greater mortality in the dredged material than in the reference material.

Phylogenetic diversity of species is discussed in the response to factor 5 above. All species selected for testing were selected based in part on their phylogenetic diversity. None of the species in the toxicity test exhibited statistically greater mortality in the dredged material than in the reference material.

Mortality results in the 28-day bioaccumulation phase test are shown in the following table. The highest mortality seen was 3 percent for *Macoma nasuta*, while no mortality was seen for *Nereis virens*.

Treatment	<i>Nereis virens</i> (% mortality)	<i>Macoma nasuta</i> (% mortality)
Control	0	1
PNSREF02	0	2
PNS02-02	0	2
PNS02-05	0	3

8. Magnitude by which contaminants whose bioaccumulation from the dredged material exceeds that from the reference material also exceed the concentrations found in comparable species living in the vicinity of the proposed disposal site.

The limited data available on the tissue levels of the contaminants in comparable species living in the vicinity of the proposed disposal site are shown in the following table. The data would indicate that those levels found in the dredged material in exceedance of reference material are not likely to have undesirable effects as a result of disposal.

Analyte  μg/kg (wet wt.)	GOMRE-T (EPA, 2006)	PNS02-02	PNS02-05
<i>Bivalves</i>			
Fluoranthene	10.0	6.48	n/a
Pyrene	10.0	11.1	n/a
<i>Polychaetes</i>			
Arsenic	16.7	n/a	3.24



Therefore, it is determined that there is no potential for undesirable effects due to bioaccumulation as a result of the presence of individual chemicals or of the solid phase of the dredged material as a whole.

Accordingly, it is concluded that the solid phase of the material proposed for disposal meets the ocean disposal criteria at 40 CFR §227.6(c)(3) and 227.27(b).

## **MPRSA Section 103 Ocean Disposal Criteria Compliance Evaluation**

### Compliance with Part 227 Subpart B- Environmental Impact

#### *§227.4 Criteria for Evaluating Environmental Impact*

The applicable prohibitions, limits, and conditions set forth in 227.4 have been satisfied as described above in Sections on Water Column, Suspended and Benthic Determinations.

#### *§227.5 Prohibited Materials*

The material to be dumped is dredged material that has been evaluated and found to meet the criteria of the ocean dumping regulations. The material approved for disposal is not:

- high level radioactive waste;
- material used for radiological, chemical, or biological warfare;
- materials whose composition and properties have been insufficiently described to enable application of 40 CFR Part 227 Subpart B;
- inert synthetic or natural materials which may float or remain in suspension so as to materially interfere with fishing, navigation, or other use of the ocean;
- medical waste as prohibited by §102(a) of MPRSA.

#### *§227.6 Constituents Prohibited as other than Trace Contaminants*

The material to be dumped has been evaluated and found that the constituents listed in this section are not present in other than trace amounts. See Sections on Water Column, Suspended and Benthic Determinations.

#### *§227.9 Limitations on Quantities of Waste Materials*

Section 227.9 provides that substances that may cause damage to the ocean environment due to the quantities in which they are dumped or seriously reduce amenities may be dumped only when the quantities to be dumped at a single time and place are controlled to prevent long-term damage to the environment or amenities. The proposed dredged material would not result in long-term damage to amenities or the environment due to the quantities in which it would be dumped. The material would be disposed of at the Pensacola Offshore ODMDS. That site was given final designation by EPA (40 CFR 228.15(h)(13)) following preparation of an EIS and determination



that it met the environmentally based site selection criteria of 40 CFR Part 228, including those related to amenities (see §§228.6(a)(2), (3), (8), and (11)). The proposed dredged material has been tested and found to meet the requirements of 40 CFR 227.6 and 227.27, as described previously. The proposed disposal would be up to the amount of approximately 190,000 cubic yards, which in addition to other recent use is within the expected capacity of the Pensacola Offshore ODMDS. In addition, disposal operations will be managed to assure dumping takes place within the site boundaries. It is concluded that the proposed disposal would not cause long-term damage to amenities or the environment due to the quantities in which it would be dumped.

#### *§227.10 Hazards to Fishing, Navigation, Shorelines, or Beaches*

Section 227.10 provides that with regard to the disposal of dredged material, the site and conditions must be such that there is no unacceptable interference with fishing or navigation and no unacceptable danger to shorelines or beaches resulting from dredged material disposal. The project material proposed for dumping would not interfere with fishing, navigation, or pose unacceptable danger to shorelines or beaches. The EIS for the Pensacola Offshore ODMDS designation and information previously outlined in this memo fully support compliance of the project material with this section.

#### *§227.13 Dredged Materials*

The material to be dumped does not meet the criteria of paragraph (b) of this section and therefore further testing was required. As discussed previously in this memo, the material was found to be environmentally acceptable for ocean dumping.

#### Compliance with Part 227 subpart C - Need for Ocean Dumping

The need for ocean dumping was made prior to initial construction of the project in 1989, following completion of the Navy's NEPA Homeporting documentation. It concluded that no other viable alternative for disposal of this type of material exists.

#### Compliance with Part 227 subpart D - Impact of the Proposed Dumping on Esthetic, Recreational and Economic Values

40 CFR Section 227 Subpart D sets forth the factors to be considered when evaluating the impact of proposed dumping on aesthetic, recreational, and economic values, including the potential for affecting recreational and commercial uses and values of living marine resources.

The factors specifically considered include recreation and commercial uses, water quality, the nature and extent of disposal operations, visible characteristics of the material to be disposed, presence of pathogens, toxic chemicals, bioaccumulative chemicals, or any other constituent which can affect living marine resources of recreational or commercial value. These would be used in an overall assessment of the proposed dumping on aesthetic, recreational, or economic values, and possible alternative methods of disposal or recycling. See 40 CFR §227.17, §227.18, and §227.19.

The Environmental Impact Statement (EIS) for the Pensacola Offshore ODMDS designation discusses the potential impacts of disposal at the site on recreational fisheries, commercial fisheries, shore recreation, and cultural resources with regard to disposal of dredged material at the site. The only items above that need be specifically addressed in this document are the visible characteristics of the material and the presence of pathogens. Section 227.7(c) contains a more detailed discussion of pathogens and dredged material. The material from this project, as is typical of dredged material, is composed of wet sediments which have accumulated on the bottom of water bodies and when ocean disposed, quickly sink to the bottom, leaving no visible plume a short time after disposal. There are no known sources of potential pathogens that could have specifically impacted the project sediments. On the basis of the discussion in the Pensacola Offshore ODMDS EIS and the findings of this memo, it is not expected that adverse impacts to the above amenities would occur.

#### Compliance with Part 227 subpart E - Impact of the Proposed Dumping on other Uses of the Ocean

40 CFR Section 227, Subpart E sets forth the factors to be considered in evaluating the impacts of the proposed dumping on other uses of the ocean, including long range impacts on other uses of the ocean. Specifically, the uses considered include, but are not limited to, commercial and recreational fishing in open ocean areas, coastal areas, and estuarine areas; recreation and commercial navigation; actual or anticipated exploitation of living and non-living marine resources; and scientific research and study. An overall assessment of the proposed dumping on the temporary and long range effects of other uses of the ocean would include irreversible or irretrievable commitment of resources that would result from the proposed dumping.

The Pensacola Offshore ODMDS EIS addresses the effects of disposal on public health and safety (including navigational hazards) and the effects on the ecosystem (biota and water column). It also addresses the environmental effects and mitigative measures that are short-term, long-term, or involve the irreversible or irretrievable commitment of resources. Based upon the discussion in the EIS and the findings in this memo, it is concluded that there would be no adverse impact on the uses to be considered under 40 CFR Part 227 Subpart E, incorporating considerations of long-term impacts (§227.20(a)) and an evaluation on an individual basis for effects on uses of the ocean for purposes other than ocean dumping (§227.20(b)).

#### **MPRSA Section 103 Conditions**

The contract issued to perform the disposal of dredged material evaluated by this MPRSA Section 103 action will contain conditions to insure disposal in compliance with the Pensacola offshore ODMDS Site Management and Monitoring Plan. The letter of concurrence for this action will identify specific data requirements to be provided to EPA.